

What is claimed is:

1. A process for forming a pattern comprising:
preparing a substrate;
forming a workpiece film on the surface of the substrate, forming a resist film on top of the workpiece film;
disposing a mask on the surface of the substrate, and irradiating the resist film with a first energy beam through the mask;
forming a first resist pattern on the surface of the substrate by developing the resist film after applying the first energy beam;
irradiating the first resist pattern with a second energy beam after removal of the mask;
forming a second resist pattern smaller than the first resist pattern by subjecting the first resist pattern to heat treatment after applying the second energy beam; and
patterning the workpiece film by use of the second resist pattern as a mask.
2. The process for forming a pattern according to Claim 1, wherein the first energy beam is excimer laser beam.
3. The process for forming a pattern according to Claim 2, wherein the resist film is a positive chemically amplified resist.
4. The process for forming a pattern according to Claim 2, wherein the first energy beam is applied partially to the repetitive portion of the first resist

pattern in a lump.

5. The process for forming a pattern according to Claim 4, wherein the second energy beam is an electron beam or ultraviolet radiation.

6. The process for forming a pattern according to Claim 1, wherein a crosslinking reaction occurs to polymer material forming the first resist pattern, caused by the irradiation with the second energy beam.

7. The process for forming a pattern according to Claim 1, further comprising determining a relationship between heating temperature when the first resist pattern is subjected to heat treatment and the size shrinkage of the first resist pattern after the first resist pattern was subjected to heat treatment.

8. The process for forming a pattern according to Claim 7, wherein the heating temperature in the heat treatment is determined by the relationship between the heating temperature and the size shrinkage of the first resist pattern.

9. The process for forming a pattern according to Claim 1, wherein the shapes of the first and second resist patterns are substantially linear or dotted.

10. A process for forming a pattern comprising:

preparing a semiconductor substrate;

forming a workpiece film on the surface of the semiconductor substrate,
forming a resist film on top of the workpiece film;

disposing a mask on the surface of the semiconductor substrate, and
irradiating the resist film with a first energy beam through the mask;

forming a first resist pattern on the surface of the substrate by developing the resist film after applying the first energy beam;

irradiating the first resist pattern with a second energy beam after removal of the mask;

forming a second resist pattern smaller than the first resist pattern by subjecting the first resist pattern to heat treatment after applying the second energy beam; and

patterning the workpiece film by use of the second resist pattern as a mask;

doping the surface of the substrate with impurity by use of the workpiece film as a mask after patterning the workpiece film, thereby forming a MOSFET on the surface of the substrate.

11. The process for forming a pattern according to Claim 10, wherein the patterned workpiece film is a gate electrode of the MOSFET.

12. A process for forming a pattern comprising:

preparing a semiconductor substrate;

forming a semiconductor device on the surface of the semiconductor substrate;

forming a workpiece film on the surface of the semiconductor substrate on which the semiconductor device is formed, and forming a resist film on top of the workpiece film;

disposing a mask on the surface of the semiconductor substrate, and

irradiating the resist film with a first energy beam through the mask;

forming a first resist pattern by developing the resist film after applying the first energy beam;

irradiating the first resist pattern with a second energy beam after removal of the mask;

forming a second resist pattern smaller than the first resist pattern by subjecting the first resist pattern to heat treatment after applying the second energy beam; and

patterning the workpiece film by use of the second resist pattern as a mask;

wherein the patterned workpiece is electrically connected to the semiconductor device.

13. The process for forming a pattern according to Claim 12, wherein the patterned workpiece film is wiring which is electrically connected to the semiconductor device.